CHAPTER 2

POPULATION CHARACTERISTICS

This chapter describes the characteristics of the fully compliant study population of the 1987 Air Force Health Study (AFHS) followup.

INTRODUCTION

Eligibility of the Ranch Hands and candidate Comparisons was determined at Baseline through detailed searches of Air Force and other Government records. Except as noted in Chapter 5, participants were recruited for the 1987 followup in accordance with the Study Protocol.

For the Baseline study, all locatable Ranch Hands and the first living member of the randomly ordered Comparison set (who was matched to the corresponding Ranch Hand by age, race, and occupation) were invited to participate. The age groupings of born in or after 1942, born between 1923 and 1941, and born in or before 1922 were used for presentation in this report, corresponding to cutpoints of 40 and 60 years of age at the 1982 Baseline examination. A study subject was classified as officer, enlisted flyer, or enlisted groundcrew according to his Vietnam military occupation. If a Comparison refused or was unlocatable at Baseline, the next Comparison in the set was contacted and invited to participate.

In the 1985 followup, all study subjects invited to the Baseline study were recruited for the followup in addition to the newly verified and locatable Ranch Hands and their matched Comparisons. A Comparison who refused or was unlocatable was replaced by the next Comparison who had not been invited previously and whose self-perception of health was the same as the Comparison he replaced.

All participants contacted for enrollment at Baseline and the 1985 followup were recruited for the 1987 followup. Newly verified/located Ranch Hands and their matched Comparisons were invited to join the study. Due to noncompliance among the Comparisons, replacements from the previously uncontacted candidate Comparisons were selected for enrollment. As in the 1985 followup, replacements were matched on self-perception of health. The replacement strategy is summarized in Chapter 3. Selection and participation issues are discussed extensively in Chapter 5.

In the 1987 followup, there were 995 Ranch Hands and 1,299 Comparisons who completed the health interval questionnaire and physical examination. The data collected on these 2,294 participants are analyzed extensively in this report. This chapter contrasts the personal characteristics and habits of the Ranch Hands and Comparisons, with the results summarized in Table 2-1. Many of the variables examined are used as covariates in subsequent analyses of clinical endpoints.

Since participants could refuse to answer any question or refuse any portion of the examination, data could be missing for some participants. Thus, not all of the analyses summarized in Table 2-1 are based on 995 Ranch Hands and 1,299 Comparisons. The actual number of participants providing data on each variable is shown in the table.

TABLE 2-1.

Analysis of Personal Characteristics and Habits by Group

Variable	Statistic	Group: Ranch Hand	Group: Comparison	p-Value
Matching Variables				
Age at Baseline (years) (discrete)	n	995	1,299	
	Number/%			
	Born >1942	405 40.7%	552 42.5%	0.617
	Born 1923-1941	555 55.8%	698 53.7%	
	Born ≤1922	35 3.5%	49 3.8%	
(continuous)	Mean	$\bar{x}$=43.88	$\bar{x}$=43.67	0.532
Race	n	995	1,299	
	Number/%			
	Nonblack	938 94.3%	1,219 93.8%	0.734
	Black	57 5.7%	80 6.2%	
Occupation	n	995	1,299	
	Number/%			
	Officer	379 38.1%	495 38.1%	0.842
	Enlisted Flyer	171 17.2%	212 16.3%	
	Enlisted Groundcrew	445 44.7%	592 45.6%	

TABLE 2-1. (continued)

Analysis of Personal Characteristics and Habits by Group

Variable	Statistic	Group: Ranch Hand	Group: Comparison	p-Value
Alcohol Variables				
Current Alcohol Use (drinks/day) (discrete)	n	990	1,298	
	Number/%			
	0-1	790 79.8%	1,026 79.0%	0.628
	>1-4	172 17.4%	226 17.4%	
	>4	28 2.8%	46 3.5%	
(continuous)	Mean	$\bar{x}$=0.74	$\bar{x}$=0.79	0.408
Lifetime Alcohol History (drink-years) (discrete)	n	985	1,296	
	Number/%			
	0	97 9.8%	108 8.3%	0.334
	>0-40	675 68.5%	885 68.3%	
	>40	213 21.6%	303 23.4%	
(continuous)	Mean	$\bar{x}$=30.88	$\bar{x}$=30.03	0.683
Current Wine Use (drinks/day) (discrete)	n	989	1,297	
	Number/%			
	Yes	382 38.6%	578 44.6%	0.005
	No	607 61.4%	719 55.4%	
(continuous)	Mean	$\bar{x}$=0.10	$\bar{x}$=0.11	0.620

TABLE 2-1. (continued)

Analysis of Personal Characteristics and Habits by Group

Variable	Statistic	Group: Ranch Hand		Group: Comparison		p-Value
Lifetime Wine History (drink-years) (discrete)	n	989		1,296		
	Number/%					
	0	528	53.4%	627	48.4%	0.037
	>0-10	416	42.1%	615	47.5%	
	>10	45	4.6%	54	4.2%	
(continuous)	Mean	$\bar{x}$=2.18		$\bar{x}$=1.96		0.469
Smoking Variables						
Current Cigarette Smoking (cigarettes/day) (discrete)	n	995		1,299		
	Number/%					
	0-Never	266	26.7%	362	27.9%	0.086
	0-Former	372	37.4%	535	41.2%	
	>0-20	181	18.2%	209	16.1%	
	>20	176	17.7%	193	14.9%	
(continuous)	Mean	$\bar{x}$=9.1		$\bar{x}$=7.7		0.014
Lifetime Cigarette Smoking History (pack-years) (discrete)	n	995		1,299		
	Number/%					
	0	267	26.8%	362	27.9%	0.764
	>0-10	272	27.3%	361	27.8%	
	>10	456	45.8%	576	44.3%	
(continuous)	Mean	$\bar{x}$=15.0		$\bar{x}$=13.9		0.159

TABLE 2-1. (continued)

Analysis of Personal Characteristics and Habits by Group

Variable	Statistic	Group				p-Value
		Ranch Hand		Comparison		
Current Cigar Smoking	n	995		1,299		
	Number/%					
	Yes	238	23.9%	349	26.9%	0.120
	No	757	76.1%	950	73.1%	
Current Pipe Smoking	n	995		1,299		
	Number/%					
	Yes	43	4.3%	45	3.5%	0.342
	No	952	95.7%	1,254	96.5%	
History of Marijuana Use[a]	n	982		1,291		
	Number/%					
	Yes	266	27.1%	394	30.6%	0.294
	No	716	72.9%	897	69.4%	
Marijuana Use Within Past 30 Days[a]	n	986		1,294		
	Number/%					
	Yes	80	8.1%	126	9.8%	0.485
	No	906	91.9%	1,168	90.2%	
Sun Exposure-Related Variables						
Average Lifetime Residential Latitude[b]	n	936		1,213		
	Number/%					
	Latitude $<37^\circ$	399	42.6%	609	50.2%	<0.001
	Latitude $\geq 37^\circ$	537	57.4%	604	49.8%	

TABLE 2-1. (continued)

Analysis of Personal Characteristics and Habits by Group

Variable	Statistic	Group: Ranch Hand		Group: Comparison		p-Value
Ethnic Background[b,c]	n	914		1,191		
	Number/%					
	A	686	75.1%	890	74.7%	0.530
	B	190	20.8%	238	20.0%	
	C	25	2.7%	34	2.9%	
	D	12	1.3%	28	2.4%	
	E	1	0.1%	1	0.1%	
Skin Color[b]	n	937		1,219		
	Number/%					
	Dark	1	0.1%	1	0.1%	0.557
	Medium	38	4.1%	35	2.9%	
	Pale	162	17.3%	208	17.1%	
	Dark Peach	514	54.9%	698	57.3%	
	Pale Peach	222	23.7%	277	22.7%	
Hair Color[b]	n	938		1,218		
	Number/%					
	Black	170	18.1%	257	21.1%	0.385
	Dark Brown	457	48.7%	574	47.1%	
	Light Brown	259	27.6%	317	26.0%	
	Blonde	47	5.0%	59	4.8%	
	Red	5	0.5%	11	0.9%	

TABLE 2-1. (continued)

Analysis of Personal Characteristics and Habits by Group

Variable	Statistic	Group				p-Value
		Ranch Hand		Comparison		
Eye Color[b]	n	937		1,217		
	Number/%					
	Brown	272	29.0%	375	30.8%	0.377
	Hazel	215	23.0%	240	19.7%	
	Green	51	5.4%	68	5.6%	
	Grey	43	4.6%	48	3.9%	
	Blue	356	38.0%	486	39.9%	
Reaction of Skin to Sun After at Least 2 Hours (Assuming several preceding episodes)[b]	n	938		1,218		
	Number/%					
	Burns Painfully	65	6.9%	75	6.2%	0.775
	Burns	118	12.6%	166	13.6%	
	Becomes Red	388	41.4%	512	42.0%	
	No Reaction	367	39.1%	465	38.2%	
Reaction of Skin to Sun After Repeated Exposure[b]	n	938		1,218		
	Number/%					
	Freckles With No Tan	18	1.9%	29	2.4%	0.494
	Tans Mildly	133	14.2%	186	15.3%	
	Tans Moderately	472	50.3%	628	51.6%	
	Tans Deep Brown	315	33.6%	375	30.8%	
Composite Sun Reaction Index[b,d]	n	938		1,217		
	Number/%					
	Low	696	74.2%	873	71.7%	0.259
	Medium	167	17.8%	251	20.6%	
	High	75	8.0%	93	7.6%	

TABLE 2-1. (continued)

Analysis of Personal Characteristics and Habits by Group

Variable	Statistic	Group				p-Value
		Ranch Hand		Comparison		
Carcinogen Exposure Variables						
Asbestos Exposure	n	995		1,299		
	Number/%					
	Yes	236	23.7%	334	25.7%	0.296
	No	759	76.3%	965	74.3%	
Ionizing Radiation Exposure	n	995		1,299		
	Number/%					
	Yes	199	20.0%	352	27.1%	<0.001
	No	796	80.0%	947	72.9%	
Herbicide Exposure	n	995		1,299		
	Number/%					
	Yes	935	94.0%	430	33.1%	<0.001
	No	60	6.0%	869	66.9%	
Insecticide Exposure	n	995		1,299		
	Number/%					
	Yes	716	72.0%	736	56.7%	<0.001
	No	279	28.0%	563	43.3%	
Industrial Chemical Exposure	n	995		1,299		
	Number/%					
	Yes	528	53.1%	731	56.3%	0.136
	No	467	46.9%	568	43.7%	

TABLE 2-1. (continued)

Analysis of Personal Characteristics and Habits by Group

Variable	Statistic	Group: Ranch Hand		Group: Comparison		p-Value
Degreasing Chemical Exposure	n	995		1,299		
	Number/%					
	Yes	594	59.7%	785	60.4%	0.754
	No	401	40.3%	514	39.6%	
Anthracene Exposure	n	994		1,297		
	Number/%					
	Yes	1	0.1%	5	0.4%	0.368
	No	993	99.9%	1,292	99.6%	
Arsenic Exposure	n	994		1,297		
	Number/%					
	Yes	24	1.3%	17	2.4%	0.070
	No	970	98.7%	1,280	97.6%	
Benzene Exposure	n	995		1,298		
	Number/%					
	Yes	38	3.8%	42	3.2%	0.520
	No	957	96.2%	1,256	96.8%	
Benzidine Exposure	n	995		1,296		
	Number/%					
	Yes	10	1.0%	14	1.1%	0.999
	No	985	99.0%	1,282	98.9%	

TABLE 2-1. (continued)

Analysis of Personal Characteristics and Habits by Group

Variable	Statistic	Group: Ranch Hand		Group: Comparison		p-Value
Chromate Exposure	n	992		1,297		
	Number/%					
	Yes	60	6.0%	54	4.2%	0.052
	No	932	94.0%	1,243	95.8%	
Coal Tar Exposure	n	995		1,298		
	Number/%					
	Yes	32	3.2%	45	3.5%	0.834
	No	963	96.8%	1,253	96.5%	
Creosote Exposure	n	995		1,298		
	Number/%					
	Yes	86	8.6%	103	7.9%	0.592
	No	909	91.4%	1,195	92.1%	
Aminodiphenyl Exposure	n	995		1,296		
	Number/%					
	Yes	3	0.3%	4	0.3%	0.999
	No	992	99.7%	1,292	99.7%	
Chloromethyl Ether Exposure	n	993		1,298		
	Number/%					
	Yes	13	1.3%	19	1.5%	0.900
	No	980	98.7%	1,279	98.5%	

TABLE 2-1. (continued)

Analysis of Personal Characteristics and Habits by Group

Variable	Statistic	Group: Ranch Hand		Group: Comparison		p-Value
Mustard Gas Exposure	n	995		1,298		
	Number/%					
	Yes	4	0.4%	7	0.5%	0.880
	No	991	99.6%	1,291	99.5%	
Naphthylamine Exposure	n	994		1,297		
	Number/%					
	Yes	36	3.6%	29	2.2%	0.064
	No	958	96.4%	1,268	97.8%	
Cutting Oil Exposure	n	995		1,298		
	Number/%					
	Yes	142	14.3%	156	12.0%	0.128
	No	853	85.7%	1,142	88.0%	
Trichloro-ethylene Exposure	n	990		1,297		
	Number/%					
	Yes	100	10.1%	130	10.0%	0.999
	No	890	89.9%	1,167	90.0%	
Ultraviolet (Not Sun) Light Exposure	n	995		1,297		
	Number/%					
	Yes	26	2.6%	33	2.5%	0.999
	No	969	97.4%	1,264	97.5%	

TABLE 2-1. (continued)

Analysis of Personal Characteristics and Habits by Group

Variable	Statistic	Group: Ranch Hand	Group: Comparison	p-Value
Vinyl Chloride Exposure	n	994	1,297	
	Number/%			
	Yes	16 1.6%	18 1.4%	0.790
	No	978 98.4%	1,279 98.6%	
Composite Carcinogen Exposure	n	982	1,288	
	Number/%			
	Yes	267 27.2%	304 23.6%	0.058
	No	715 72.8%	984 76.4%	
Personal and Family Health Variables				
Cholesterol (mg/dl) (discrete)	n	994	1,297	
	Number/%			
	<200	334 33.6%	447 34.5%	0.844
	≥200-230	314 31.6%	413 31.8%	
	>230	346 34.8%	437 33.7%	
(continuous)	Mean	$\bar{x}$=218.40	$\bar{x}$=216.79	0.329
HDL (mg/dl) (discrete)	n	994	1,297	
	Number/%			
	<40	328 33.0%	397 30.6%	0.204
	≥40-50	336 33.8%	484 37.3%	
	>50	330 33.2%	416 32.1%	
(continuous)	Mean	$\bar{x}$=46.89	$\bar{x}$=46.99	0.845

TABLE 2-1. (continued)

Analysis of Personal Characteristics and Habits by Group

Variable	Statistic	Group: Ranch Hand	Group: Comparison	p-Value
Cholesterol-HDL Ratio (discrete)	n	994	1,297	
	Number/%			
	≤4.2	328 33.0%	453 34.9%	0.597
	>4.2-5.5	356 35.8%	458 35.3%	
	>5.5	310 31.2%	386 29.8%	
(continuous)	Mean	$\bar{x}$=4.95	$\bar{x}$=4.88	0.270
Diabetic Class*	n	990	1,292	
	Number/%			
	Normal	750 75.8%	995 77.0%	0.782
	Impaired	142 14.3%	176 13.6%	
	Diabetic	98 9.9%	121 9.4%	
Differential Cortisol Response (1985) (mg/dl) (discrete)	n	960	1,223	
	Number/%			
	≤0.6	317 33.0%	413 33.8%	0.182
	>0.6-4.0	349 36.4%	409 32.8%	
	>4.0	294 30.6%	401 33.4%	
(continuous)	Mean	$\bar{x}$=2.30	$\bar{x}$=2.49	0.265
Percent Body Fat (discrete)	n	995	1,299	
	Number/%			
	Lean/Normal: ≤25%	803 80.7%	1,012 77.9%	0.113
	Obese: >25%	192 19.3%	287 22.1%	
(continuous)	Mean	$\bar{x}$=21.46	$\bar{x}$=21.67	0.335

TABLE 2-1. (continued)

Analysis of Personal Characteristics and Habits by Group

Variable	Statistic	Group: Ranch Hand		Group: Comparison		p-Value
Family History of Heart Disease	n	995		1,299		
	Number/%					
	Yes	240	24.1%	294	22.6%	0.432
	No	755	75.9%	1,005	77.4%	
Family History of Heart Disease Before Age 50	n	995		1,299		
	Number/%					
	Yes	33	3.3%	38	2.9%	0.678
	No	962	96.7%	1,261	97.1%	
Risk Taking Variables						
Scuba Diving	n	995		1,299		
	Number/%					
	Yes	120	12.1%	180	13.9%	0.228
	No	875	87.9%	1,119	86.1%	
Auto, Boat, or Motorcycle Racing	n	995		1,299		
	Number/%					
	Yes	131	13.2%	176	13.5%	0.838
	No	864	86.8%	1,123	86.5%	
Skydiving	n	995		1,299		
	Number/%					
	Yes	14	1.4%	31	2.4%	0.124
	No	981	98.6%	1,268	97.6%	

TABLE 2-1. (continued)

Analysis of Personal Characteristics and Habits by Group

Variable	Statistic	Group: Ranch Hand		Group: Comparison		p-Value
Mountain Climbing	n	995		1,299		
	Number/%					
	Yes	85	8.5%	98	7.5%	0.424
	No	910	91.5%	1,201	92.5%	
Hang Gliding	n	995		1,298		
	Number/%					
	Yes	8	0.8%	17	1.3%	0.342
	No	987	99.2%	1,281	98.7%	
Plane Racing or Acrobatics	n	995		1,299		
	Number/%					
	Yes	46	4.6%	49	3.8%	0.364
	No	949	95.4%	1,250	96.2%	
Surfboard Riding	n	995		1,299		
	Number/%					
	Yes	95	9.5%	87	6.7%	0.016
	No	900	90.5%	1,212	93.3%	
Long-Distance Sailing	n	994		1,299		
	Number/%					
	Yes	48	4.8%	59	4.5%	0.820
	No	946	95.2%	1,240	95.5%	

TABLE 2-1. (continued)

Analysis of Personal Characteristics and Habits by Group

Variable	Statistic	Group				p-Value
		Ranch Hand		Comparison		
Fast Downhill Skiing	n	995		1,299		
	Number/%					
	Yes	174	17.5%	206	15.9%	0.326
	No	821	82.5%	1,093	84.1%	
Other Variables						
Education	n	987		1,293		
	Number/%					
	High School	508	51.5%	642	49.7%	0.414
	College	479	48.5%	651	50.3%	
Blood Type	n	988		1,292		
	Number/%					
	A	389	39.4%	525	40.6%	0.302
	AB	39	4.0%	37	2.9%	
	B	103	10.4%	154	11.9%	
	O	457	46.3%	576	44.6%	
Presence of Pre-SEA Acne	n	987		1,289		
	Number/%					
	Yes	317	32.1%	391	30.3%	0.386
	No	670	67.9%	898	69.7%	

TABLE 2-1. (continued)

Analysis of Personal Characteristics and Habits by Group

Variable	Statistic	Group				p-Value
		Ranch Hand		Comparison		
Personality Type (1985) (discrete)	n	956		1,221		
	Number/%					
	A Direction	432	45.2%	523	42.8%	0.292
	B Direction	524	54.8%	698	57.2%	
(continuous)	Mean Test Score		$\bar{x}$=3.7		$\bar{x}$=3.7	0.999
Presence of PTSD (1985)	n	959		1,219		
	Number/%					
	Yes	10	1.0%	6	0.5%	0.216
	No	949	99.0%	1,213	99.5%	
Military Status	n	995		1,299		
	Number/%					
	Active Duty	52	5.2%	71	5.5%	0.973
	Retired	572	57.4%	730	56.2%	
	Separated	303	30.5%	411	31.6%	
	Reserve Forces	59	5.9%	75	5.8%	
	Deceased[f]	9	0.9%	12	0.9%	

TABLE 2-1. (continued)

Analysis of Personal Characteristics and Habits by Group

Variable	Statistic	Group: Ranch Hand		Group: Comparison		p-Value
1986 Individual Income	n	986		1,285		
	Number/%					
	None	102	10.3%	129	10.0%	0.760
	≤$9,999	43	4.4%	56	4.4%	
	$10,000-$14,999	45	4.6%	63	4.9%	
	$15,000-$19,999	59	6.0%	82	6.4%	
	$20,000-$24,999	108	11.0%	134	10.4%	
	$25,000-$29,999	125	12.7%	154	12.0%	
	$30,000-$34,999[9]	91	9.2%	139	10.8%	
	$35,000-$39,999	99	10.0%	120	9.3%	
	$40,000-$44,999	65	6.6%	98	7.6%	
	$45,000-$49,999	55	5.6%	63	4.9%	
	$50,000-$54,999	46	4.7%	65	5.1%	
	$55,000-$59,999	22	2.2%	45	3.5%	
	$60,000-$64,999	30	3.0%	30	2.3%	
	$65,000-$69,999	12	1.2%	18	1.4%	
	$70,000-$74,999	23	2.3%	13	1.0%	
	$75,000-$79,999	12	1.2%	11	0.9%	
	$80,000-$84,999	8	0.8%	10	0.8%	
	$85,000-$89,999	8	0.8%	12	0.9%	
	$90,000-$94,999	3	0.3%	5	0.4%	
	$95,000-$99,999	4	0.4%	6	0.5%	
	≥$100,000	26	2.6%	32	2.5%	

TABLE 2-1. (continued)

Analysis of Personal Characteristics and Habits by Group

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[a]Estimated by randomized response techniques.

[b]Blacks excluded.

[c]Ethnic Background:
- A: English, Welsh, Scottish, or Irish
- B: Scandinavian, German, Polish, Russian, Other Slavic, Jewish, or French
- C: Spanish, Italian, or Greek
- D: Mexican, American Indian, or Asian
- E: African

[d]Composite Sun Reaction Index (from Reaction of Skin After at Least 2 Hours After First Exposure and Reaction of Skin After Repeated Exposure):
- High: Burns Painfully and/or Freckles With No Tan
- Medium: Burns and/or Tans Mildly
- Low: All Other Reactions

[e]Diabetic Class:
- Normal: <140 mg/dl 2-hour postprandial glucose
- Impaired: >140-<200 mg/dl 2-hour postprandial glucose
- Diabetic: Verified past history of diabetes or ≥200 mg/dl 2-hour postprandial glucose

[f]Died after the 1987 followup examination.

[g]Median income category for Ranch Hands and Comparisons.

MATCHING VARIABLES

In accordance with the Study Protocol, the Ranch Hands and Comparisons were matched by age, race, and military occupation while in Southeast Asia (SEA). Group differences in the matching variables could have arisen due to differential participation; however, there were no significant differences between the Ranch Hands and Comparisons for age, race, or occupation, as shown in Table 2-1. Mean ages of the Ranch Hands and Comparisons in 1982, the year of the Baseline examination, were 43.88 years and 43.67 years, respectively. As shown in the discrete analysis, the percentage of participants born in or before 1922 and born in or after 1942 was slightly higher for the Comparisons than the Ranch Hands. Although the Ranch Hands and Comparisons are matched by race, a higher percentage of Black Comparisons than Black Ranch Hands chose to participate in the 1987 followup. A higher percentage of Ranch Hand enlisted flyers and a lower percentage of Ranch Hand enlisted groundcrew than the Comparisons participated. The percentage of officers in both groups was the same.

DRINKING HABITS

In the assessment of drinking habits, current alcohol use, lifetime alcohol history, current wine use, and lifetime wine history were analyzed.

Although the results of the analyses on current alcohol use did not reveal any significant differences, a higher percentage of Comparisons than Ranch Hands was classified as heavy drinkers (>4 drinks per day). Of the Comparisons, 3.5 percent drank four or more drinks per day, as compared to 2.8 percent of the Ranch Hands. The mean number of drinks per day was 0.79 for the Comparisons and 0.74 for the Ranch Hands.

The analyses of lifetime alcohol history also did not detect any significant differences between the two groups. Based on lifetime alcohol consumption, the Ranch Hands had a higher mean than the Comparisons (30.88 drink-years vs. 30.03 drink-years); however, the percentage of heavy drinkers (>40 drink-years) was higher for the Comparisons than the Ranch Hands (23.4% vs. 21.6%).

Based on the discrete analysis of current wine use (yes/no), significantly more Comparisons than Ranch Hands reported that they drank wine at the time of the 1987 followup (44.6% vs. 38.6%, p=0.005). However, the average wine consumption was similar for the two groups (Ranch Hand mean=0.10 drinks/day vs. Comparison mean=0.11 drinks/day).

The discrete analysis of lifetime wine history also detected a significant difference between the Ranch Hands and Comparisons (p=0.037), with more moderate wine drinkers in the Comparison group. Of the Ranch Hands, 53.4 percent, 42.1 percent, and 4.6 percent were nonwine drinkers (0 drink-years), moderate wine drinkers (>0-10 drink-years), and heavy wine drinkers (>10 drink-years), respectively. The corresponding percentages for the Comparisons were 48.4, 47.5, and 4.2, respectively. The mean of the Ranch Hands was 2.18 drink-years, as contrasted with a mean of 1.96 drink-years for the Comparisons; these means were not significantly different.

SMOKING HABITS

The analyses of smoking habits were based on the reported use of cigarettes, cigars, pipes, and marijuana. Both current and lifetime cigarette smoking habits were examined. Analyses of cigar and pipe smoking were based on current use. For marijuana use, data on past history and use within the past 30 days were analyzed.

The results of the current cigarette smoking analyses showed that the Ranch Hands smoked significantly more cigarettes per day than the Comparisons, an observation also noted at the 1985 examination. The Ranch Hands smoked an average of 9.1 cigarettes per day, as contrasted with an average of 7.7 cigarettes per day ($p=0.014$) for the Comparisons. In the discrete analysis of current cigarette smoking, a marginally significant difference was detected ($p=0.086$), with a greater percentage of current smokers in the Ranch Hand group. At the time of the 1987 followup, 64.1 percent of the Ranch Hands did not smoke (participants either never smoked or formerly smoked), as contrasted to 69.1 percent of the Comparisons.

Although no significant differences were identified based on lifetime cigarette smoking history, the mean number of pack-years for the Ranch Hands was higher than the mean for the Comparisons (15.0 pack-years vs. 13.9 pack-years).

The results of the analyses of current cigar and pipe smoking revealed similar patterns in the two groups.

Data concerning marijuana use were collected by a random response technique[1] to overcome the problem of participants either refusing or giving misleading replies to these highly sensitive and personal questions. With this technique, a coin was flipped by the respondent, who then answered either a marijuana question or a neutral unrelated question, which had an answer of known probability. The outcome of the coin toss was unknown to the interviewer. Thus, the question to which the reply was given could not be traced, although the proportion of the population that had smoked marijuana could be estimated. These questions were asked at the 1985 followup. Since the questions were highly sensitive, they were only included in the 1987 health interval questionnaire for the 1987 participants who did not attend the 1985 followup. Responses from 1985 and 1987 were combined to compute the percentages provided in Table 2-1 for the 1987 followup participants. The groups were found to be similar on both past history and use of marijuana within the 30 days prior to being questioned. Approximately 30 percent of both groups reported ever having used marijuana, and fewer than 10 percent were current smokers.

SUN EXPOSURE CHARACTERISTICS

With the increased emphasis on skin malignancy, information was collected for the following eight variables that characterize sun exposure and reaction to sun exposure: average lifetime residential latitude, ethnic background, skin color, hair color, eye color, reaction of skin to sun at least 2 hours after several preceding episodes of sun exposure, reaction of skin to sun after repeated exposure, and a composite sun exposure index. Data on average

lifetime residential history and skin, hair, and eye color were collected during the 1985 followup. In the 1987 followup, these data were collected only for the participants who did not attend the 1985 followup. These variables were candidate covariates for the skin neoplasm analyses. Since Blacks were excluded in the analyses of skin neoplasms, they were also excluded in these analyses.

Analysis of the average lifetime residential latitude revealed that significantly more Comparisons than Ranch Hands had an average lifetime residential latitude of less than 37 degrees North, the geographical median latitude of the continental United States (50.2% vs. 42.6%, $p<0.001$). A line across the United States from San Francisco, California, to Richmond, Virginia, approximates 37 degrees North latitude. Thus, the Comparisons have a more southerly average latitude than the Ranch Hands.

No significant differences between the Ranch Hands and the Comparisons were detected in the analyses of the other sun exposure variables.

EXPOSURE TO CARCINOGENS

Information was collected from the participants on whether they had been exposed to selected carcinogens (yes/no). The carcinogens were grouped into two sets. The first set consisted of asbestos, ionizing radiation, herbicides, insecticides, industrial chemicals, and degreasing chemicals. The 15 carcinogens in the second set were anthracene, arsenic, benzene, benzidine, chromates, coal tar, creosote, aminodiphenyl, chloromethyl ether, mustard gas, naphthylamine, cutting oils, trichloroethylene, ultraviolet light (not sun), and vinyl chloride. A composite carcinogen exposure variable was constructed from the second set of carcinogens. This variable was coded as yes if the participant had been exposed to any of the carcinogens in the second set.

Significant group differences were detected for three of the six variables in the first set. More Comparisons than Ranch Hands reported that they had been exposed to ionizing radiation (27.1% vs. 20.0%, $p<0.001$). The percentage of participants who reported being exposed to herbicides and insecticides was higher for the Ranch Hands than the Comparisons ($p<0.001$ for both), a reasonable expectation based on the nature of the Ranch Hand mission in Vietnam. Of the Ranch Hands, 94.0 percent reported being exposed to herbicides, as contrasted to 33.1 percent of the Comparisons. The relatively high percentage of Comparisons reporting exposure to herbicides is of interest and will be clarified by the results of the serum dioxin assays. For insecticides, 72.0 percent of the Ranch Hands and 56.7 percent of the Comparisons reported that they had been exposed to insecticides. No differences were detected between the two groups for asbestos, industrial chemical, and degreasing chemical exposure.

The results of the analyses on the second set of carcinogens revealed borderline significant differences between the Ranch Hands and Comparisons for arsenic, chromate, and naphthylamine exposure. Based on the analysis of the composite carcinogen exposure variable, the difference between the two groups was also marginally significant. More Comparisons than Ranch Hands reported that they had been exposed to arsenic (2.4% vs. 1.3%, $p=0.070$). Of the Ranch Hands, 6.0 percent reported chromate exposure; the percentage of Comparisons

who reported chromate exposure was 4.2 percent (p=0.052). Naphthylamine exposure was also higher in the Ranch Hands than in the Comparisons (3.6% vs. 2.2%, p=0.064). Based on the analysis of the composite carcinogen exposure variable, more Ranch Hands than Comparisons reported being exposed to at least one carcinogen in the second set (27.2% vs. 23.6%, p=0.058).

PERSONAL AND FAMILY HEALTH

Six measures of personal health that were candidate covariates in selected adjusted analyses were also examined: cholesterol, high density lipoprotein (HDL), cholesterol-HDL ratio, diabetic class, differential cortisol response, and percent body fat. Differential cortisol was based on information gathered at the 1985 followup, and the analysis was consequently restricted to those participants who attended both the 1985 and 1987 examinations. No significant group differences were detected in the analyses of these variables.

Family history of heart disease was also examined. The results of the analyses showed that the family history of heart disease before age 50 or without an age restriction was similar in the two groups.

RISK-TAKING BEHAVIOR

Risk-taking behavior patterns of the study population were assessed by a series of questions that emphasized participation in potentially dangerous recreational activities. Nine activities were analyzed: scuba diving, racing (auto, boat, or motorcycle), skydiving, mountain climbing, hang gliding, plane racing or acrobatics, surfboard riding, long-distance sailing, and fast downhill skiing. The results showed that significantly more Ranch Hands than Comparisons reported that they had ever participated in surfboard riding (9.5% vs. 6.7%, p=0.016). No significant differences between the two groups were detected in the analyses of the other eight activities.

OTHER CHARACTERISTICS

The two groups were also contrasted on education, blood type, presence of pre-SEA acne, personality type, presence of post traumatic stress disorder (PTSD), current military status, and 1986 individual income. The analysis of personality type and PTSD was restricted to those 1987 followup participants who attended the 1985 followup. The results of the analyses showed that the Ranch Hands and Comparisons were similar on all seven variables.

SUMMARY

The study population for the 1987 followup of the AFHS consisted of 2,294 participants: 995 Ranch Hands and 1,299 Comparisons. The personal characteristics and habits of the Ranch Hands and Comparisons were contrasted. The variables selected to characterize the two groups included all of the candidate covariates in the adjusted analyses of clinical endpoints.

The two groups were contrasted on the matching variables (age, race, and occupation), drinking habits, smoking habits, sun exposure characteristics, exposure to carcinogens, selected personal and family health variables, risk-taking behavior, and other characteristics (education, blood type, personality type, PTSD, current military status, and 1986 individual income).

No differences between the two groups were found for the matching variables, personal and family health variables, and other characteristics. The Ranch Hands and Comparisons reported similar current and lifetime alcohol use; however, the average current alcohol use was higher for the Comparisons and the Ranch Hands had a higher average lifetime alcohol history. These differences were not significant. Significantly more Comparisons than Ranch Hands drank wine at the time of the 1987 followup; however, the mean numbers of wine drinks per day were not significantly different. For lifetime wine history, the distribution of wine drinkers (nonwine drinkers, moderate wine drinkers, and heavy wine drinkers) was significantly different for the two groups. The Comparisons had a higher percentage of moderate wine drinkers than the Ranch Hands. However, the mean number of wine drink-years for the two groups was similar.

At the time of the 1987 followup, the Ranch Hands smoked significantly more cigarettes than the Comparisons. The Ranch Hands had a higher average lifetime cigarette smoking history than the Comparisons, but this difference was not significant. The two groups had similar current cigar, current pipe, and past and recent marijuana smoking habits.

The two groups reported similar sun exposure characteristics. However, significantly more Comparisons than Ranch Hands had an average lifetime residential latitude of less than 37 degrees North.

Differences in reported exposure to carcinogens were assessed for 21 carcinogens or groups of carcinogens and one composite exposure variable constructed from reported exposure to 15 of the 21 carcinogens. As anticipated, significantly more Ranch Hands than Comparisons reported being exposed to herbicides and insecticides. Reported ionizing radiation exposure was significantly higher in the Comparisons. Marginally significant differences were detected in reported exposure to arsenic (Comparisons>Ranch Hands), chromates (Ranch Hands>Comparisons), and naphthylamine (Ranch Hands>Comparisons). More Ranch Hands than Comparisons reported being exposed to at least one of the carcinogens used to construct the composite exposure variable; the difference was marginally significant. No differences were detected for the other 15 carcinogen variables.

The risk-taking behavior of the two groups was characterized by participation in nine potentially dangerous recreational activities. Significantly more Ranch Hands than Comparisons reported that they had ever ridden surfboards. No differences in participation in the other eight activities were identified.

In summary, the 995 Ranch Hands and 1,299 Comparisons who participated in the 1987 AFHS followup were found to have similar personal characteristics and habits.

CHAPTER 2

REFERENCES

1. Greenberg, B.G., A-L.A. Abdul-Ela, W.R. Simmons, and D.G. Horvitz. 1969. The unrelated question randomized response model: Theoretical framework. J. Am. Stat. Assoc. 64(326):520-539.